LAN Node 200
Technical Service Manual

Particle Measuring Systems
1855 South 57th Court
Boulder, Colorado 80301
(303) 443-7100

P/N 10186-3

Theory of Operation

The LAN Node 200 uses a universal input power supply and manifold transfomer so the voltage can be changed by changing the power entry module voltage setting and installing the correct fuse(s). A voltage regulator LM340-15 is mounted on the case and is used to provide +15 VDC or + 24 VDC for the analog sensors. The solid state relay is used to drive the stepper on a manifold. Refer to WD-990 in Internal Wiring Diagrams, Appendix A.

Interpretation of Analog Data

The analog values are measured by the LAN Node 200 with a 12-bit analog-to-digital converter. This converter can make a single conversion in about 20 milliseconds, so each of the 16 analog channels will be sampled approximately 3 to 4 times per second. The value reported by the LAN Node 200 is the average of all the samples taken during the sampling interval. The absolute accuracy of the analog acquisition system is 0.5 % of full scale, and the resolution is 0.1 % of full scale.

Each analog channel can be driven either by a 0-5 volt signal, or by a 4-20 milliamp signal. This is determined by jumpers on the PMS 1208 Board and is set to 4-20 mA unless specified otherwise. When a 4-20 milliamp source is used, a current-to-voltage converter changes the 4-20 mA signal to 0-5 volts. In either case, the LAN Node 200 will scale the analog data without regard to the type of sensor connected, and in a way which depends on if the LAN Node 200 extension feature has been enabled via switch SW1 on the PMS 1212 Board (refer to Table 1).

PCB 1212 Circuit Description

The PCB 1212 is a Z80 microprocessor data acquisition system designed for use with Particle Measuring Systems LPS particle sensors and 4-20 milliamp environmental sensors. Particle sensors, environmental sensors and communication interfaces are connected to the LAN Node through the PCB 1208 connector board.

A Watchdog (U23) will reset the Z80 if the control program locks up or if the +5 VDC drops below 4.5 VDC. An EEPROM (U21) contains the software for controlling the LAN Node 200 and a battery-backed RAM (U20) stores data. These two devices are controlled by a GAL (U19). The GAL (U18) controls the PIOs, CTCs and the Analog circuitry.

PIO (U10) is used to read in the switch positions that determine the LAN Node 200 address, baud rate and analog function.

Particle sensor signals are interfaced to the PCB 1212 using differential drivers and receivers. After the differential receivers U1 and U2, the signals are sent to Z80 counter/timer chips (CTC) to be accumulated. Each time these CTCs count 256 pulses, they interrupt the Z80 processor. Laser reference status information is also transmitted using differential techniques, but then the signal is routed to U8, a PIO, for interfacing to the microprocessor.

Analog signals from the environmental sensors are multiplexed by U12 and U13 and then are processed by the MAX 163 (U11) analog to digital converter. This converter can make a single conversion in about 20 milliseconds, so each of the 16 analog channels will be sampled approximately three to four times a second. The value reported by the LAN Node 200 is the average of all the samples taken during the sample interval. The absolute accuracy of the analog acquisition system is 0.5% of full scale, and a resolution of 0.1 % of full scale.

Timing signals for the LAN Node 200 are generated by U16, a Z80 counter/timer chip. This chip provides the transmit and receive clocks for the SIO.

Serial communication for the LAN Node 200 is handled by U7, a serial input/output controller (SIO). Channel A of this IC interfaces to the RS-485 multi-drop channel. Channel B is used as a general purpose RS-232 interface and as the primary communication channel if the LAN Node 200 is used as a stand-alone device.

Manifold control is provided by port B of U8, a PIO controller. B0 of this port is used to control a solid state relay to produce step signals. B1 through B6 are configured as inputs to sense the position of the manifold encoder disk.

Troubleshooting

Refer to the following troubleshooting checklist to solve minor problems which may occur.

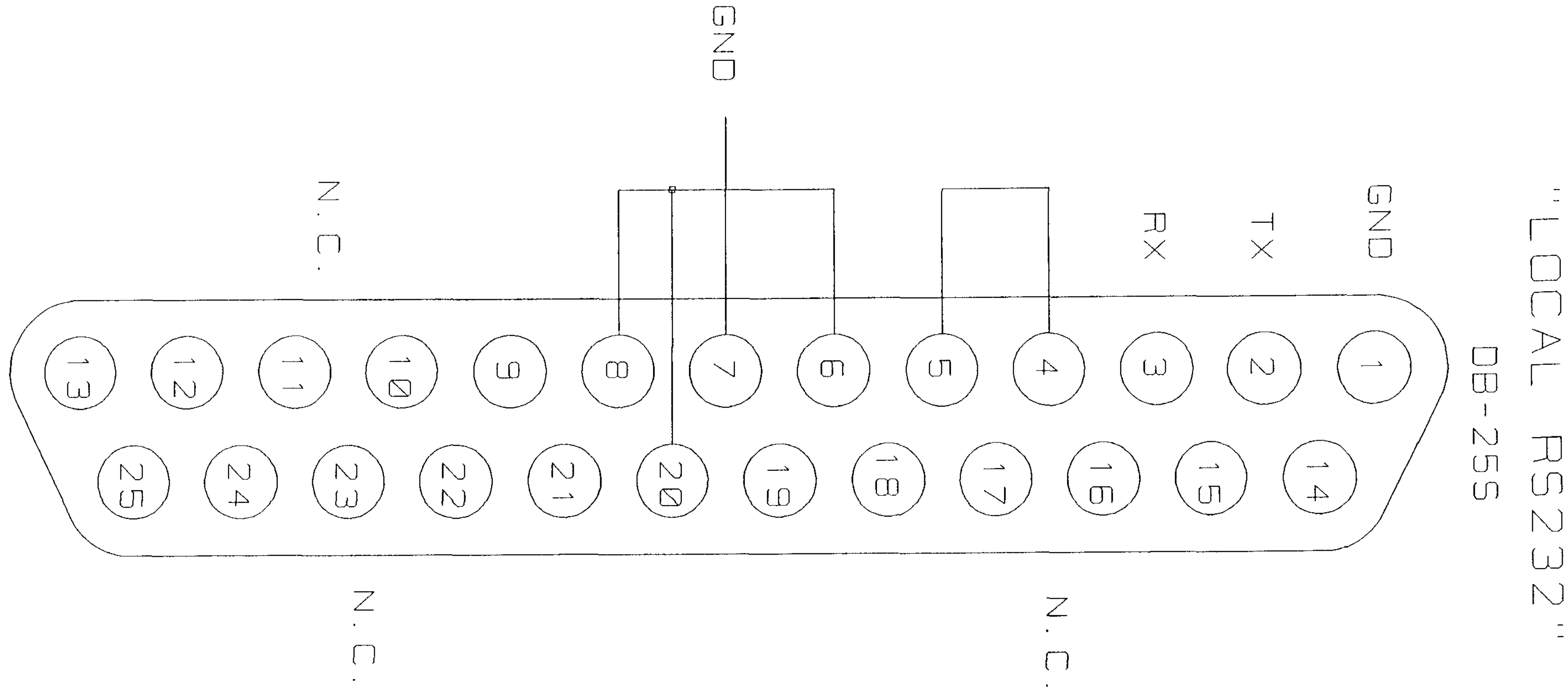
Problem	Solutions
No power LED	Check LAN Node 200 fuse.
	Check power supply fuse (5A).
	Make sure all cables are connected.
	Measure + 5 VDC on PCB-1208 board.
	LED may be bad.
LAN Node does not communicate with FMS or RS-485	Check switch settings on PCB-1212 board for correct baud rate and address.
	Check all cabling and power. If the LAN Node 200 is used as an RS-232 device, make sure the DSR line is connected and working.
	PCB-1212 board is probably bad.
LAN Node does not communicate with LOCAL port	Check switch settings on PCB-1212 board for correct baud rate and address.
	Check all cabling and power.
	PCB-1212 board is probably bad.

Internal Wiring Diagrams



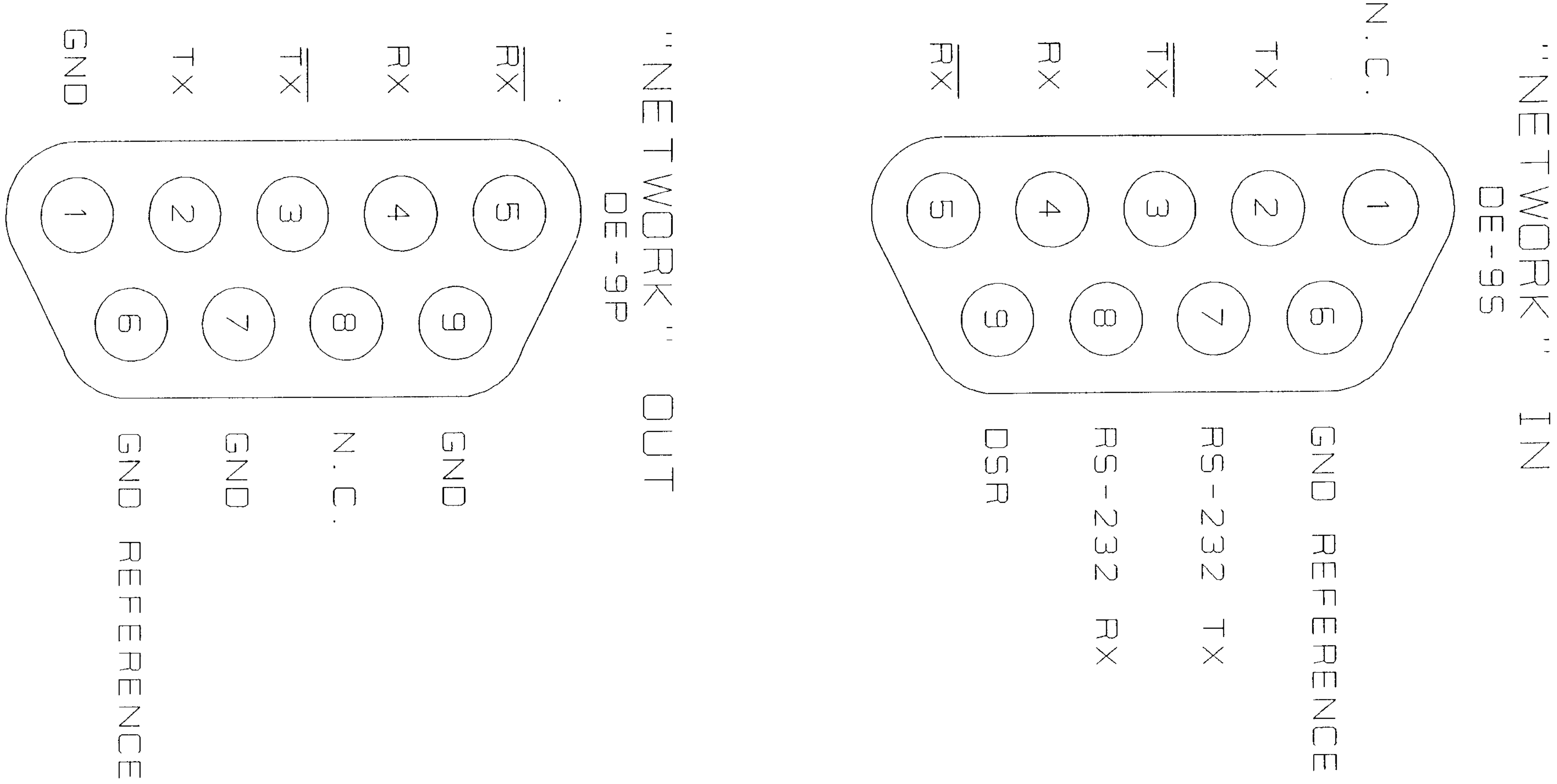
WR # 842
4-15-92

PARTICLE MEASURING SYSTEMS INC. 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100			
LAN-NODE 200 "PARTICLE SENSOR #1, #2" PINOUT DIAGRAM			
DATE 4-15-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-986	SLOT NUMBER	JOB NUMBER	



WR # 842
4-15-92

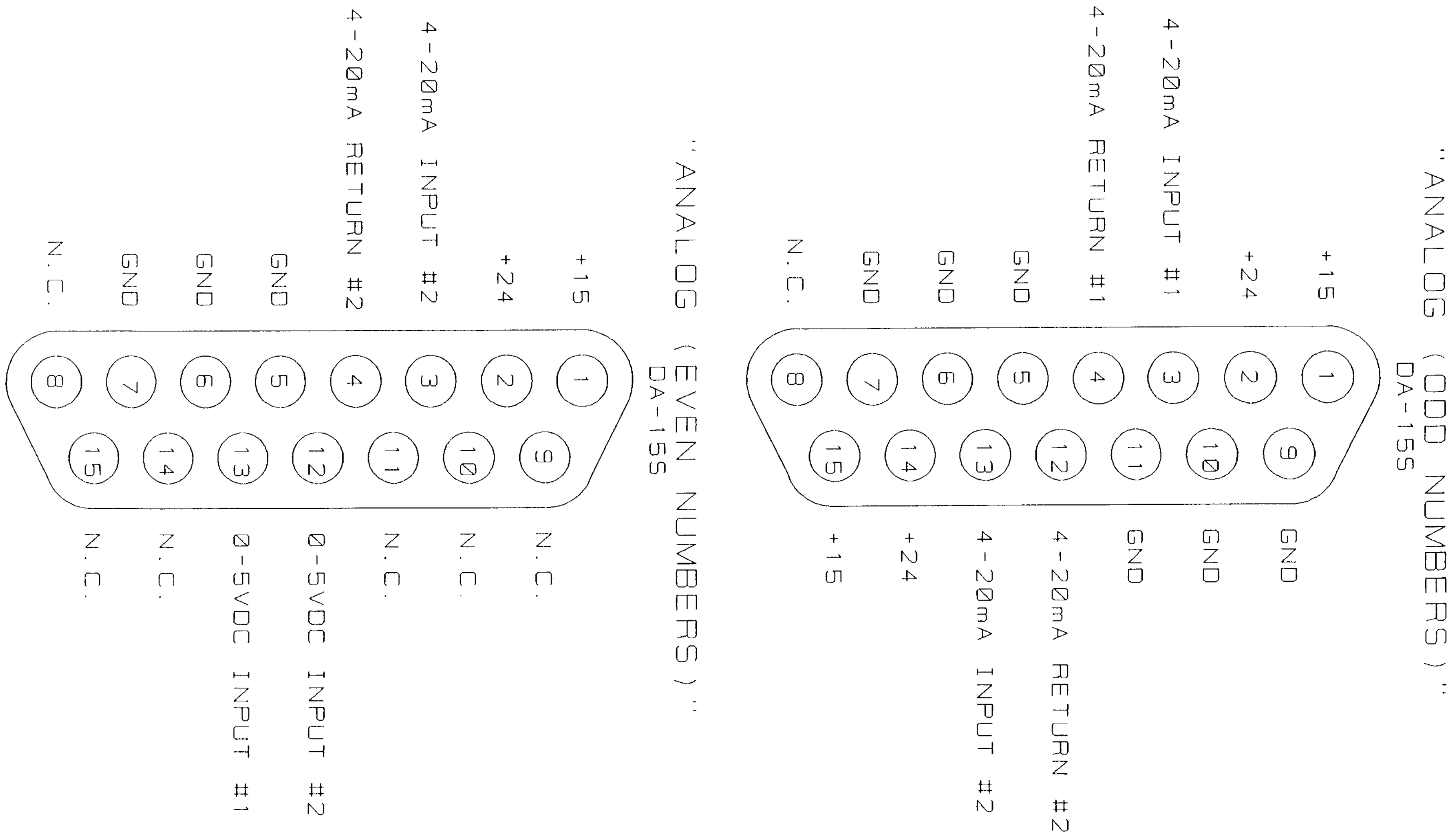
PARTICLE MEASURING SYSTEMS INC. 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100			
LAN-NODE 200 "LOCAL RS-232" PINOUT DIAGRAM			
DATE 4-15-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-987	SLOT NUMBER	JOB NUMBER	



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LAN-NODE 200
"NETWORK" IN/OUT PINOUT DIAGRAM

DATE 4-15-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-988	SLOT NUMBER	JOB NUMBER	



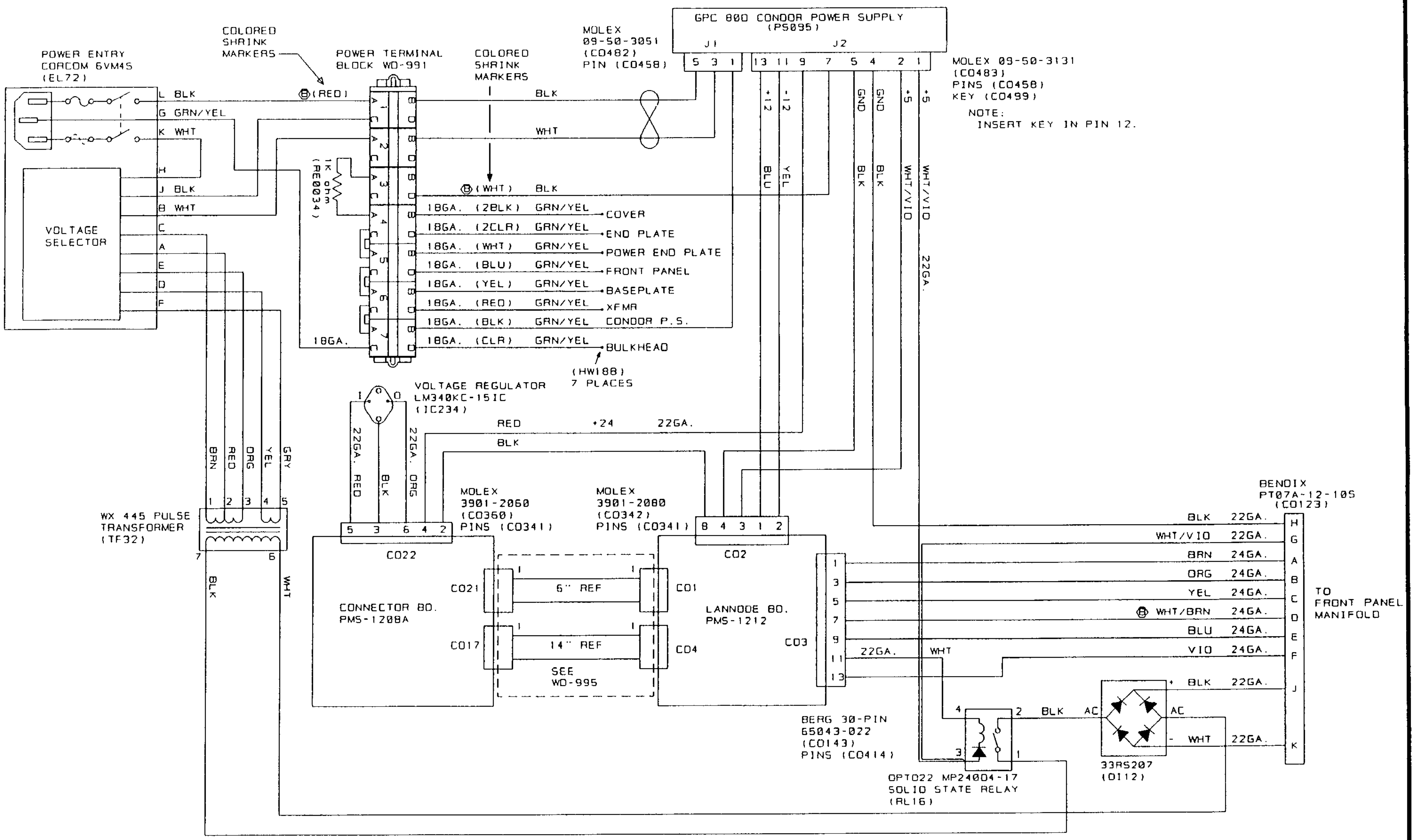
WR # 842
4-15-92

PARTICLE MEASURING SYSTEMS INC.
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LAN-NODE 200
"ANALOG xx" PINOUT DIAGRAM

DATE	4-15-92	REVISED	6-5-92	DRAWN BY	MGC	APPROVED BY	MTS

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
WD-989		



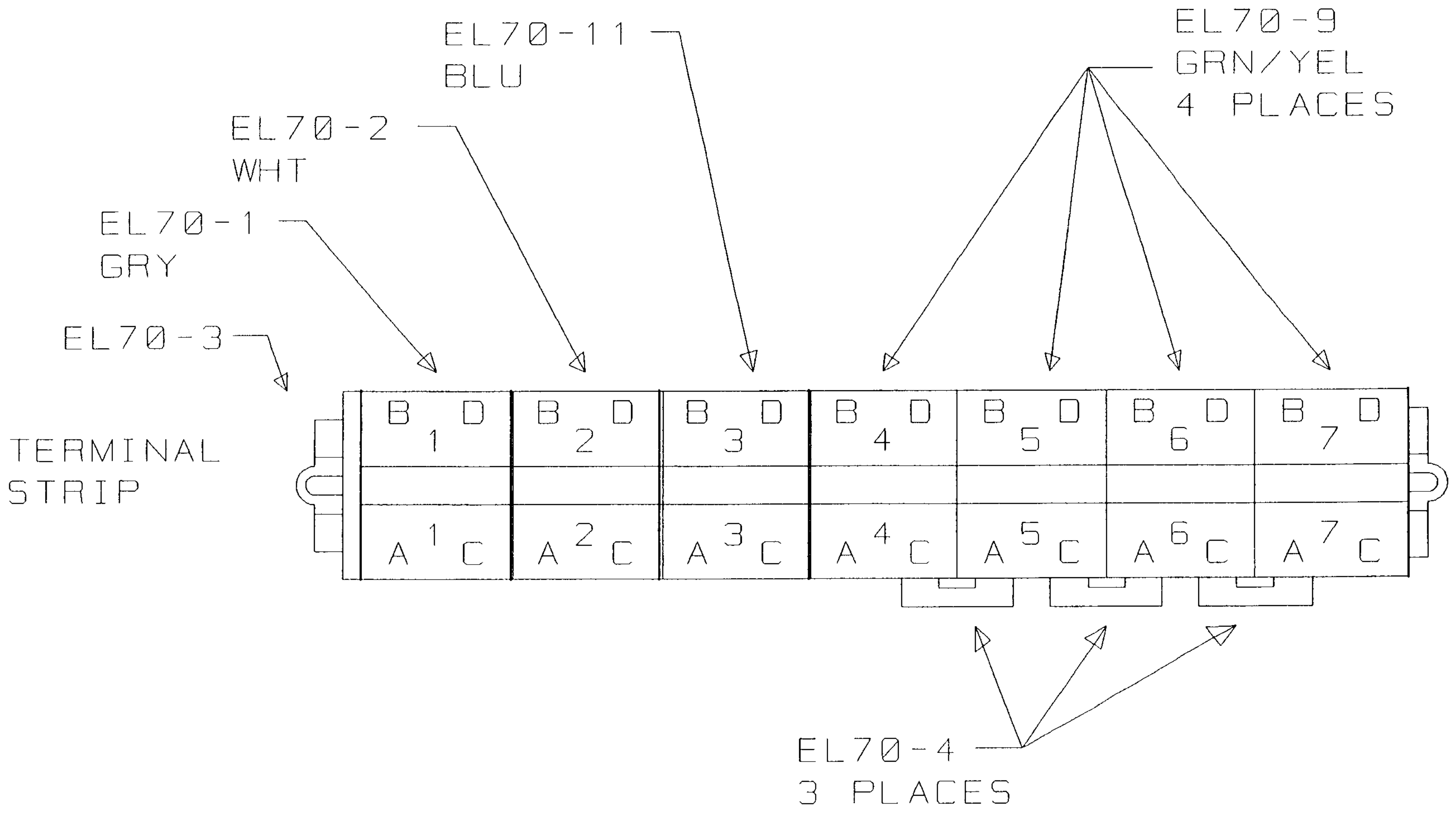
NOTE:
ALL WIRES ARE 20GA. UNLESS NOTED.

REV.	ECO/WR	DATE	REMARKS
A	WR#818	2-28-92	Created form WD-1000
	WR#841	6-18-92	Universal AC Input
B	DISC.	2-22-93	Wht/Brn was Grn, added Red shrink marker. (Wht) was (Red)
	DISC.	11-22-93	Per. M. Suzuki

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LAN - NODE 200
INTERNAL WIRING DIAGRAM

DATE 2-28-92	REVISED 11-22-93	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-990	REV. B SHEET 1 OF 1	JOB NUMBER	PART NUMBER AE-990



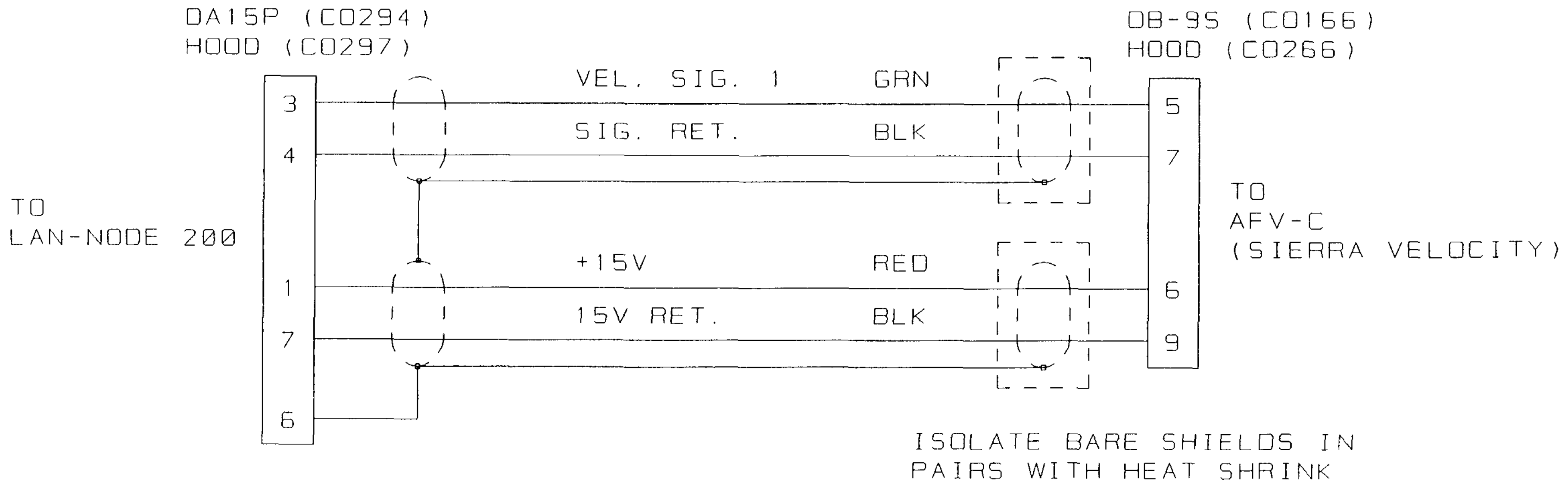
USE LB186-10 NUMBERING STRIPS.
(CUT OFF 8 THRU 10)

REV.	ECO/WR	DATE	REMARKS
	WR#818	2-13-92	

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LAN-NODE 200
POWER STRIP ASSEMBLY

DATE 3-5-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-991	REV. SHEET 1 OF 1	JOB NUMBER	PART NUMBER AE-991

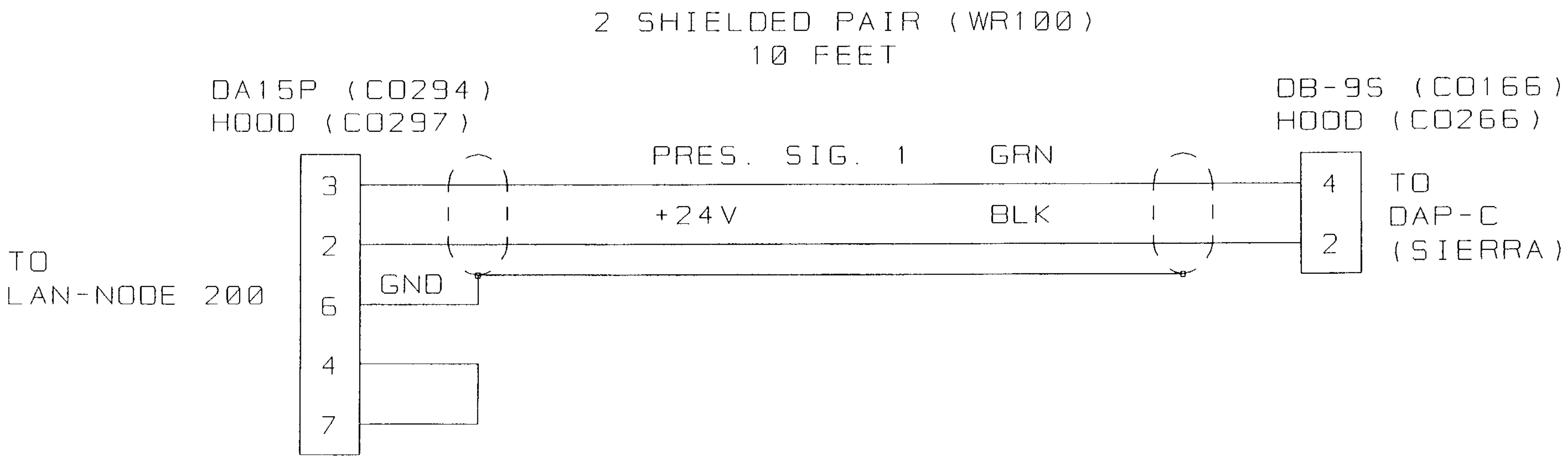


WR # 822
2-29-92

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LAN-NODE 200
TO AFV-C CABLE

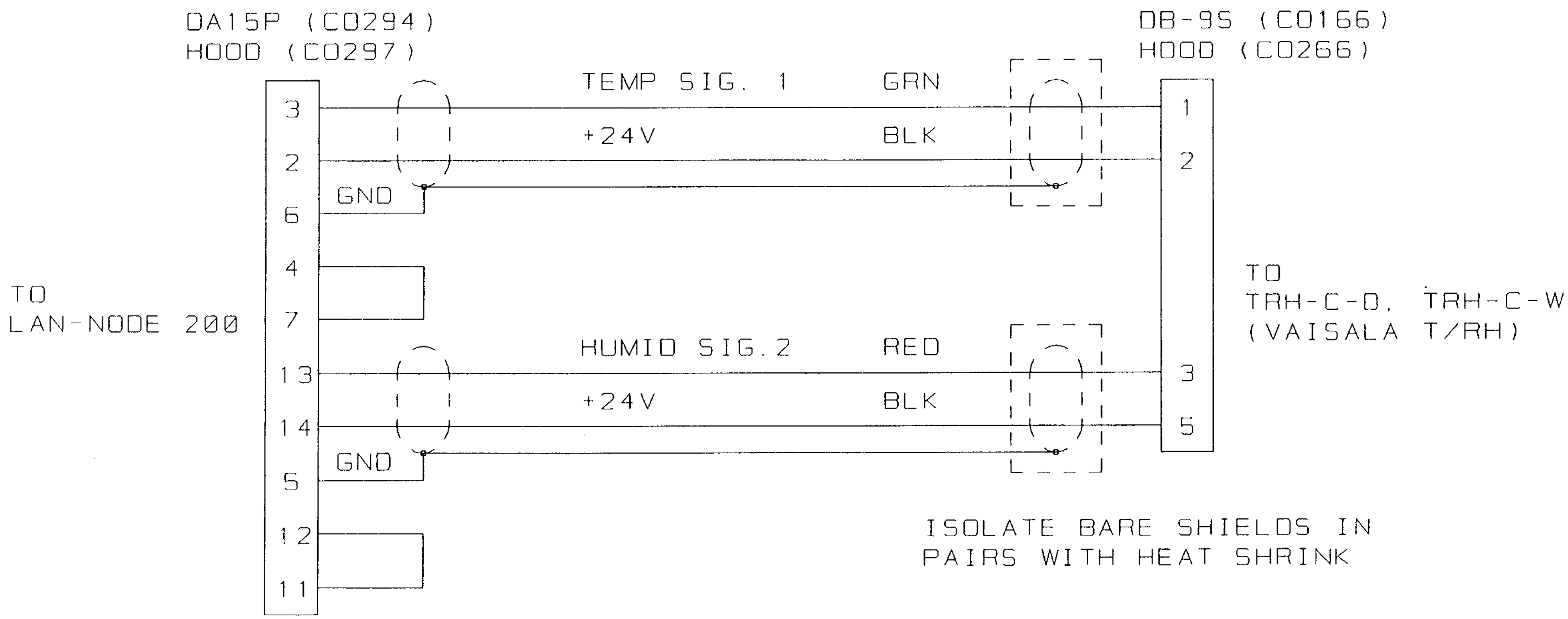
DATE 2-28-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-992	SLOT NUMBER	JOB NUMBER	



PARTICLE MEASURING SYSTEMS INC. 1855 South 57th Court, Boulder, Colorado 80301 (303)443-7100							
LAN-NODE 200 TO DAP-C CABLE							
DATE	2-28-92	REVISED	5-20-92	DRAWN BY	MGC	APPROVED BY	MTS
DRAWING NUMBER WD-993		SLOT NUMBER			JOB NUMBER		

WR # 822
2-29-92

CLERICAL
5-20-92

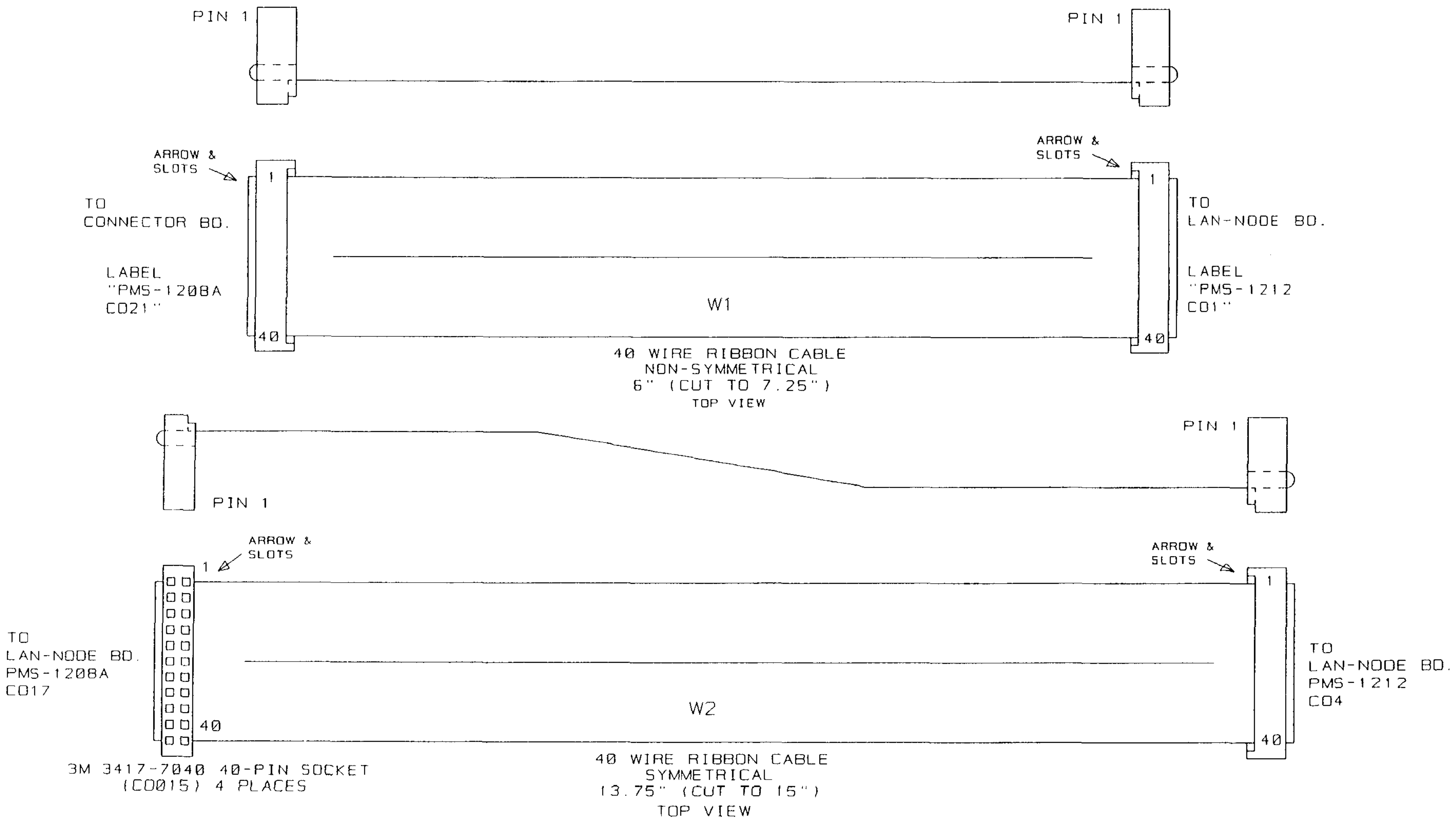


WR # 822
2-29-92

PARTICLE MEASURING SYSTEMS INC.
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LAN-NODE 200
TO TRH-C-D, TRH-C-W CABLE

DATE 2-28-92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-994	SLOT NUMBER	JOB NUMBER	



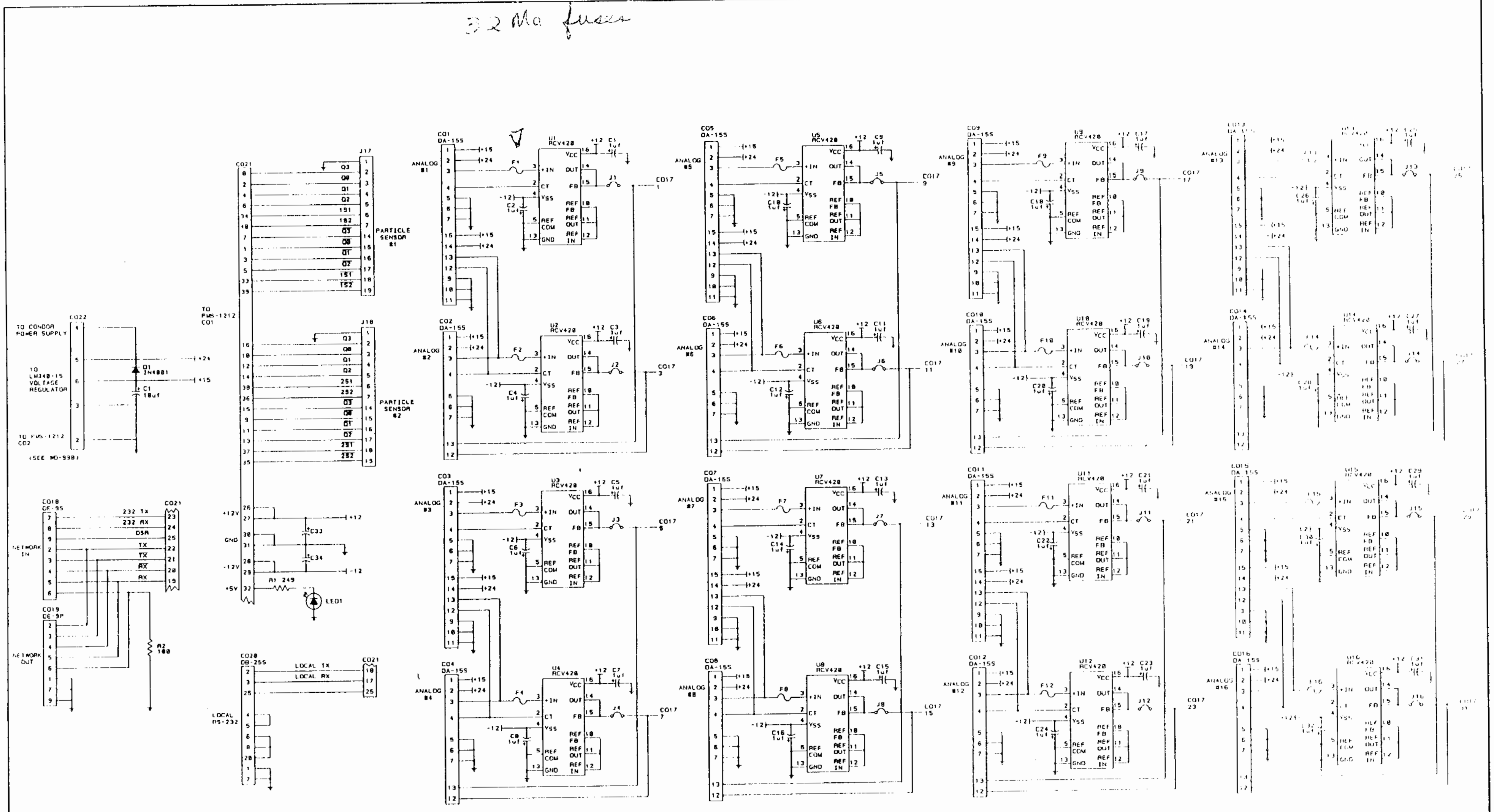
REV.	ECO/WR	DATE	REMARKS
	WR#818	2-13-92	

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CONNECTOR BOARD TO LAN-NODE BOARD RIBBON CABLES

DATE 3-5--92	REVISED	DRAWN BY MGC	APPROVED BY MTS
DRAWING NUMBER WD-995	REV. / SHEET 1 OF 1	JOB NUMBER	PART NUMBER AE-995

Schematics and CVSs



NOTES:
1. CO17, 40 PIN IDC, TO PMS-1212 CO4
2. F1-F16 IN SOCKETS
3 J1-J16 NORMALY INSTALLED FOR 4 20mA
REMOVE FOR 0-5VDC INPUT

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LAN-NODE 200
CONNECTOR BOARD

DATE 2-11-92 | REVISED | DRAWN BY MGC | APPROVED BY
DRAWING NUMBER PMS-1208A | SLOT NUMBER | JOB NUMBER

BOARD # - PMS 1208A
NAME - CONNECTOR BOARD FOR LANNODE 200
SLOT # -
ENTRY DATE - 25 FEB 92
REVISION DATE - 03 APR 92
INSTRUMENT TYPE - LANNODE 200

[1] Backside of board.
[2] FS46 is socket for FS45.

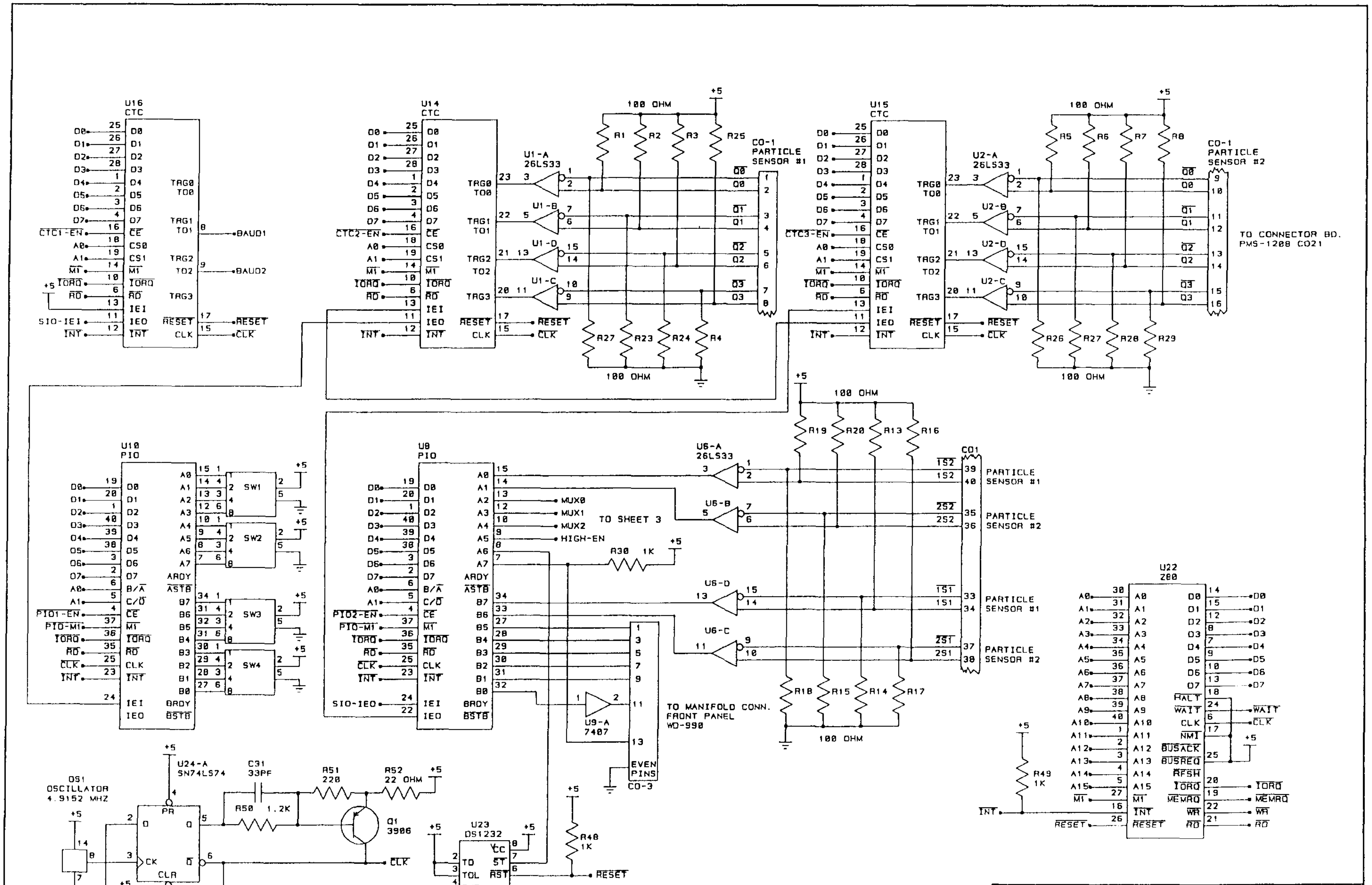
Change#: *WR799*,1545

PCB1208A

	C001	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C002	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C003	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C004	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C005	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C006	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C007	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C008	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C009	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C010	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C011	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C012	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C013	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C014	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C015	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C016	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C017	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C018	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C019	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C020	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C021	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C022	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C023	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C024	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C025	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C026	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C027	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C028	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C029	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C030	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C031	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V		C032	010 CA072	C062C105K5X5CA KEMET 1.0UF,50V
	C033	010 CA043	41KS475B025MIA		C034	010 CA043	41KS475B025MIA
	C035	010 CA042	SPRAGUE 199D106X0020CE2 10UF	1	C0001	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0002	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0003	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0004	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0005	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0006	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0007	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0008	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0009	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0010	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0011	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0012	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0013	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0014	010 C0422	AMP 745077-4 DB-15S STRGHT PCB	1	C0015	010 C0422	AMP 745077-4 DB-15S STRGHT PCB
1	C0016	010 C0422	AMP 745077-4 DB-15S STRGHT PCB		C0017	010 C0286	3M 3432-2302 40PIN IDC HDR ST
1	C0018	010 C0424	AMP 745076-4 DB-9S STRGHT PCB	1	C0019	010 C0447	AMP 745071-2 PC MT D9 PLUG W/SCRW
1	C0020	010 C0423	AMP 745078-4 DB-25S STRGHT PCB		C0021	010 C0286	3M 3432-2302 40PIN IDC HDR ST
	C0022	010 C0363	MOL 3928-1063 6 PIN STR HEADER		D001	010 DI04	1N4001 R-S: 600 PRV, 1A DIODE
2	F001	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F001	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F002	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F002	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F003	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F003	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F004	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F004	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F005	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F005	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F006	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F006	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F007	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F007	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F008	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F008	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F009	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F009	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F010	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F010	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F011	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F011	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F012	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F012	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F013	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F013	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F014	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F014	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F015	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F015	010 FS46	281005 VERTICAL PCB FUSE HOLDER
2	F016	010 FS45	273.031 1/32AMP FAST BLO LITTLEFUSE	2	F016	010 FS46	281005 VERTICAL PCB FUSE HOLDER
	J001	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J002	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J003	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J004	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J005	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J006	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J007	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J008	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J009	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J010	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J011	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J012	010 26-GA-BUSS	26 GAUGE BUSS WIRE
	J013	010 26-GA-BUSS	26 GAUGE BUSS WIRE		J014	010 26-GA-BUSS	26 GAUGE BUSS WIRE

PCB1208A

	J015	010	26-GA-BUSS	26 GAUGE BUSS WIRE		J016	010	26-GA-BUSS	26 GAUGE BUSS WIRE
1	J017	010	C0423	AMP 745078-4 DB-25S STRGHT PCB	1	J018	010	C0423	AMP 745078-4 DB-25S STRGHT PCB
1	LED01	010	LED07	HLMP-3301, HP, T-1 3/4 RED		PC001	010	PC1208A	PMS 1208A, LAN-NODE 200 CONN BOAR
	R001	010	RE0240	RN55D2490F 249 OHM		R002	010	RE0010	RN55D1000F 100 OHM
	U001	010	OA42	RCV420KP 4-20 MA RECEIVER		U002	010	OA42	RCV420KP 4-20 MA RECEIVER
	U003	010	OA42	RCV420KP 4-20 MA RECEIVER		U004	010	OA42	RCV420KP 4-20 MA RECEIVER
	U005	010	OA42	RCV420KP 4-20 MA RECEIVER		U006	010	OA42	RCV420KP 4-20 MA RECEIVER
	U007	010	OA42	RCV420KP 4-20 MA RECEIVER		U008	010	OA42	RCV420KP 4-20 MA RECEIVER
	U009	010	OA42	RCV420KP 4-20 MA RECEIVER		U010	010	OA42	RCV420KP 4-20 MA RECEIVER
	U011	010	OA42	RCV420KP 4-20 MA RECEIVER		U012	010	OA42	RCV420KP 4-20 MA RECEIVER
	U013	010	OA42	RCV420KP 4-20 MA RECEIVER		U014	010	OA42	RCV420KP 4-20 MA RECEIVER
	U015	010	OA42	RCV420KP 4-20 MA RECEIVER		U016	010	OA42	RCV420KP 4-20 MA RECEIVER



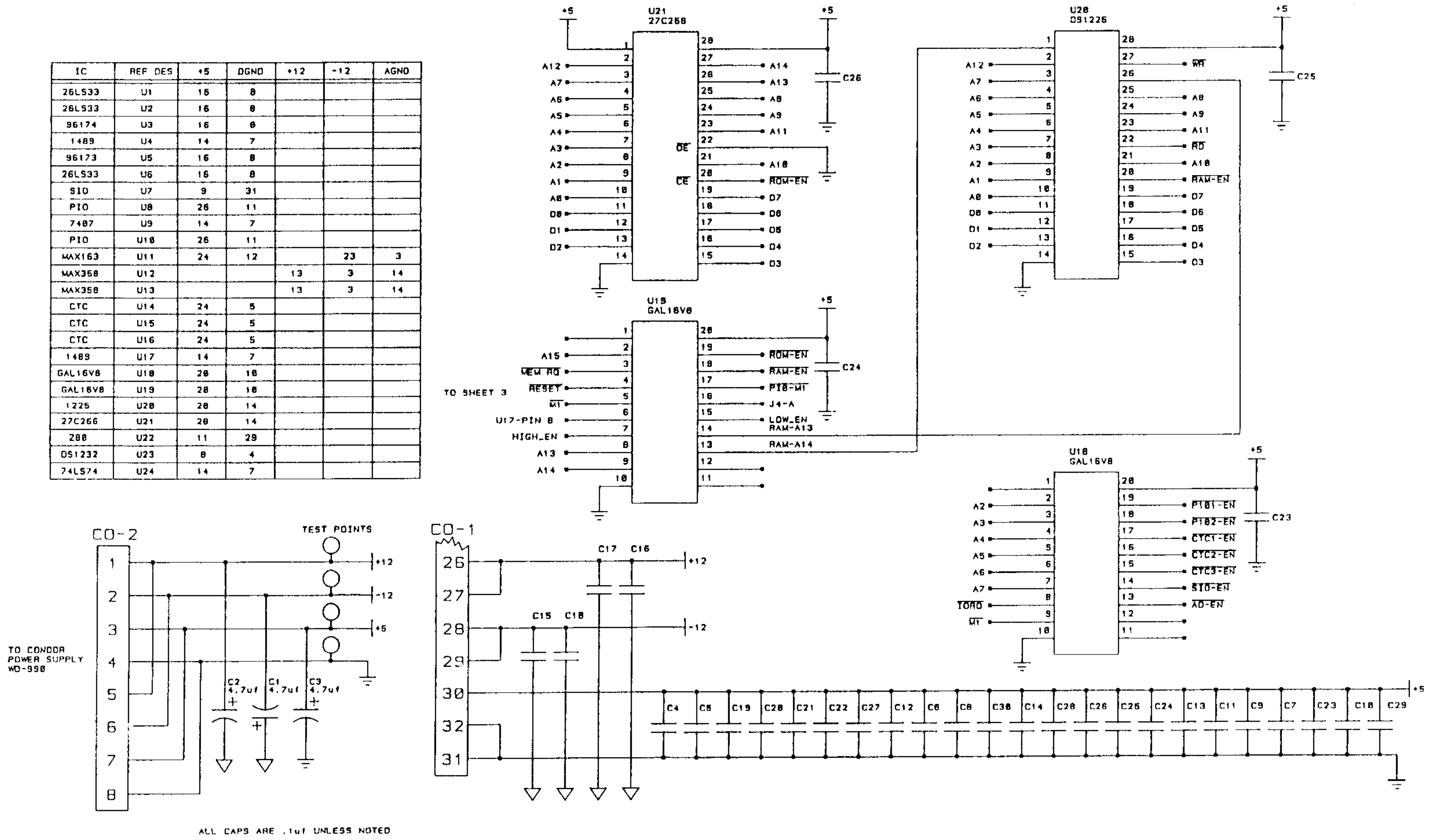
PARTICLE MEASURING SYSTEMS INC.
1855 South 57th Court, Boulder Colorado 80301 (303) 443-7100

LAN-NODE-200
SHEET 1 OF 3

DATE 8-21-91	REVISED 3-6-92	DRAWN BY OKN	APPROVED BY

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
PMS-1212-4		

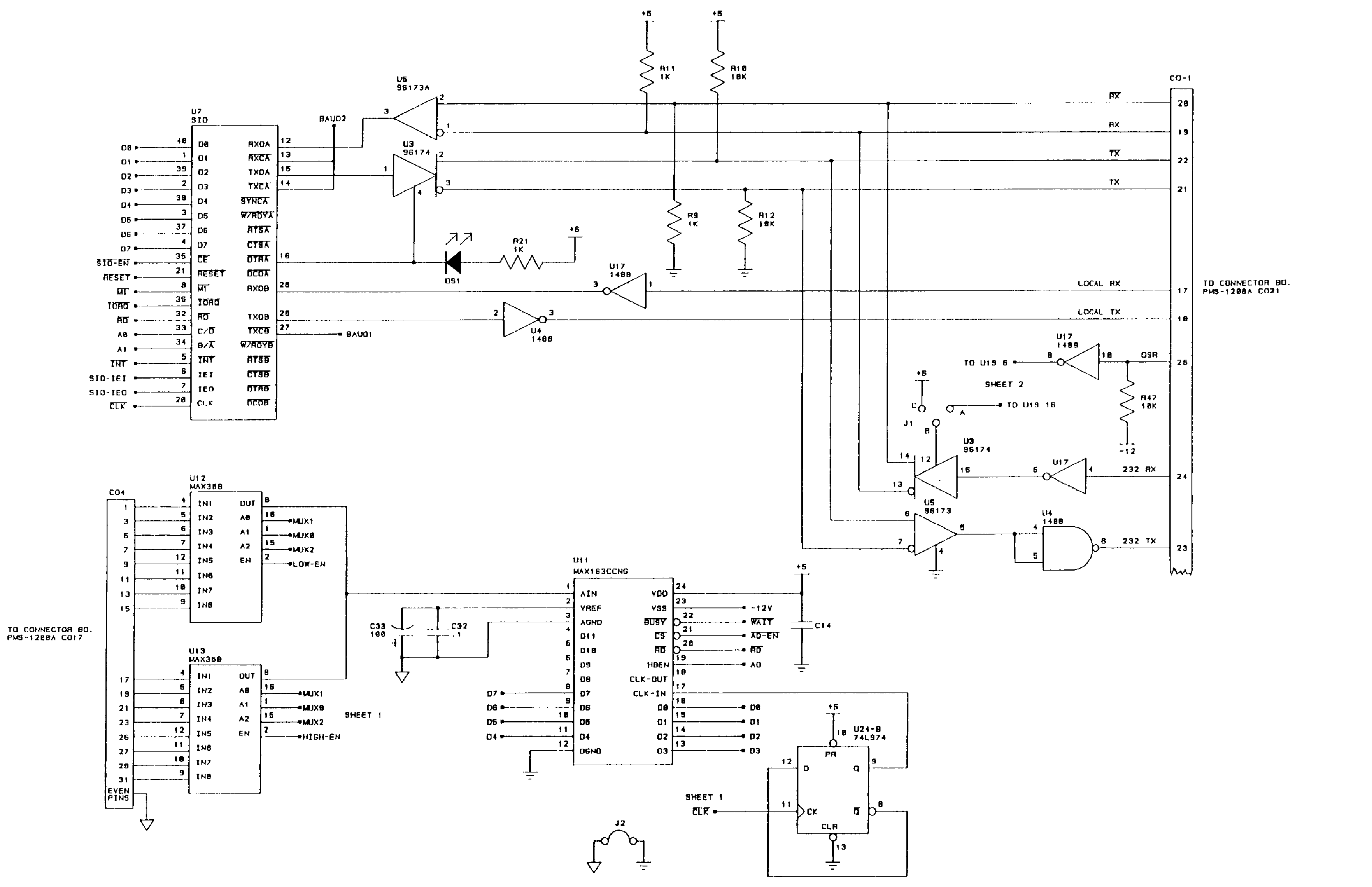
IC	REF DES	+5	DGND	+12	-12	AGND
26LS33	U1	16	8			
26LS33	U2	16	8			
96174	U3	16	8			
1489	U4	14	7			
96173	U5	16	8			
26LS33	U6	16	8			
SIO	U7	9	31			
PIO	U8	26	11			
7407	U9	14	7			
PIO	U10	26	11			
MAX163	U11	24	12		23	3
MAX358	U12			13	3	14
MAX358	U13			13	3	14
CTC	U14	24	5			
CTC	U15	24	5			
CTC	U16	24	5			
1489	U17	14	7			
GAL16V8	U18	20	10			
GAL16V8	U19	20	10			
1225	U20	28	14			
27C256	U21	28	14			
Z80	U22	11	29			
DS1232	U23	8	4			
74LS74	U24	14	7			



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LAN-NODE 200
SHEET 2 OF 3

DATE 8-21-91	REVISED 3-3-92	DRAWN BY DKN	APPROVED BY
DRAWING NUMBER PMS-1212-4	SLOT NUMBER	JOB NUMBER	



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1855 South 57th Court, Boulder Colorado 80301 (303) 443-7100

LAN-NODE 200

SHEET 3 OF 3

DATE 8-21-91	REVISED 8-31-93	DRAWN BY DKN	APPROVED BY MFS

DRAWING NUMBER	SLOT NUMBER	JOB NUMBER
PMS-1212-4		

BOARD # - PMS 1212-4
NAME - MOTHERBOARD
SLOT # -
ENTRY DATE - 21 APR 93
REVISION DATE - 24 AUG 93
INSTRUMENT TYPE - LAN-NODE-200

ASSEMBLY DRAWING [YES] AD 1212-4
SCHEMATIC [YES] PMS 1212-4

NOTE: Ground, -12V, +12V, and +5 must remain open.

[1] 20 pin 0.3" socket SKT05.
[2] 28 pin 0.6" socket SKT07.
[3] 40 pin 0.6" socket SKT08.
[4] Do not install in Lannode 200.
[5] Install U24 with pin 13 not installed (out of board), then jumper pin 13 to pin 14 on IC.
[6] Attach per assembly drawign.
[7] Install after wash.
[8] Install at A-B.

Change#: WR830,
1593,1732,2054,3071,3134,3165,
ECO 1555,3167

PCB1212-4

C001	010	CA043	4.7UF,25VDC,+/-20%,R,.2Cx.34H,PT	C002	010	CA043	4.7UF,25VDC,+/-20%,R,.2Cx.34H,PT
C003	010	CA043	4.7UF,25VDC,+/-20%,R,.2Cx.34H,PT	C004	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C005	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C006	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C007	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C008	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C009	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C010	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C011	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C012	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C013	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C014	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C015	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C016	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C017	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C018	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C019	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C020	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C021	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C022	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C023	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C024	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C025	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C026	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C027	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C028	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C029	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM	C030	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C031	010	CA034	33PF,300VDC,+- 5%,R,.12Cx.27H,UPDMI	C032	010	CA010	.1UF,50VDC,+/-10%,R,.2Cx.24H,UPDM
C033	010	CA082	100UF,6.3VDC,+/-20%,R,.1Cx.4H,PT	CO001	010	CO286	3M 3432-2302 40PIN IDC HDR ST
CO002	010	CO340	MOL 39-28-1083 8 PIN SQ STR HEADER	CO003	010	CO023	26P,M,ST HDR,LONG EL,3W,.062,U/C
CO004	010	CO286	3M 3432-2302 40PIN IDC HDR ST	8 J001	010	26-GA-BUSS	26 GAUGE BUSS WIRE
J002	010	26-GA-BUSS	26 GAUGE BUSS WIRE	LABOR	900	WC[C]PICK	!WORK CENTER-PICK COMPLETION
LED01	010	LED07	HLMP-3301, HP, T-1 3/4 RED	OS1	010	OS06	SG51K 4.9152MHZ EPSON (DIP)
PC001	010	PC1212	PMS 1212, LAN-NODE/LPS-SA MAIN BD	Q001	010	TR03	2N 3906
R001	010	RE0010	RN55D1000F 100 OHM	R002	010	RE0010	RN55D1000F 100 OHM
R003	010	RE0010	RN55D1000F 100 OHM	R004	010	RE0010	RN55D1000F 100 OHM
R005	010	RE0010	RN55D1000F 100 OHM	R006	010	RE0010	RN55D1000F 100 OHM
R007	010	RE0010	RN55D1000F 100 OHM	R008	010	RE0010	RN55D1000F 100 OHM
R009	010	RE0034	RN55D1001F 1K	6 R010	010	RE0013	RN55D1002F 10K
R011	010	RE0034	RN55D1001F 1K	6 R012	010	RE0013	RN55D1002F 10K
R013	010	RE0010	RN55D1000F 100 OHM	R014	010	RE0010	RN55D1000F 100 OHM
R015	010	RE0010	RN55D1000F 100 OHM	R016	010	RE0010	RN55D1000F 100 OHM
R017	010	RE0010	RN55D1000F 100 OHM	R018	010	RE0010	RN55D1000F 100 OHM
R019	010	RE0010	RN55D1000F 100 OHM	R020	010	RE0010	RN55D1000F 100 OHM
R021	010	RE0034	RN55D1001F 1K	R022	010	RE0010	RN55D1000F 100 OHM
R023	010	RE0010	RN55D1000F 100 OHM	R024	010	RE0010	RN55D1000F 100 OHM
R025	010	RE0010	RN55D1000F 100 OHM	R026	010	RE0010	RN55D1000F 100 OHM
R027	010	RE0010	RN55D1000F 100 OHM	R028	010	RE0010	RN55D1000F 100 OHM
R029	010	RE0010	RN55D1000F 100 OHM	R030	010	RE0034	RN55D1001F 1K
R032	010	---	UNFILLED LOCATION ON PCB	R033	010	---	UNFILLED LOCATION ON PCB
R034	010	---	UNFILLED LOCATION ON PCB	R035	010	---	UNFILLED LOCATION ON PCB
R036	010	---	UNFILLED LOCATION ON PCB	R037	010	---	UNFILLED LOCATION ON PCB
R038	010	---	UNFILLED LOCATION ON PCB	R039	010	---	UNFILLED LOCATION ON PCB
R040	010	---	UNFILLED LOCATION ON PCB	R041	010	---	UNFILLED LOCATION ON PCB
R042	010	---	UNFILLED LOCATION ON PCB	R043	010	---	UNFILLED LOCATION ON PCB
R044	010	---	UNFILLED LOCATION ON PCB	R045	010	---	UNFILLED LOCATION ON PCB
R046	010	---	UNFILLED LOCATION ON PCB	R047	010	RE0013	RN55D1002F 10K
R048	010	RE0034	RN55D1001F 1K	R049	010	RE0034	RN55D1001F 1K
R050	010	RE0120	RC07GF122J 1/4W 1.2K	R051	010	RE0142	RC07GF221J 1/4W 220 OHM
R052	010	RE0141	RC07GF220J 1/4W 22 OHM	7 SW001	010	SW159	EECO 230056 GB DIP SWITCH BCD 2PO
7 SW002	101	SW159	EECO 230056 GB DIP SWITCH BCD 2POLE	7 SW003	010	SW159	EECO 230056 GB DIP SWITCH BCD 2PO
7 SW004	010	SW159	EECO 230056 GB DIP SWITCH BCD 2POLE	U001	010	IC005	26LS33 QUAD DIFF LINE RECEIVER
U002	010	IC005	26LS33 QUAD DIFF LINE RECEIVER	U003	010	IC242	96174 DRIVER (75174)
U004	010	IC202	MC1488L QUAD EIA-232C DRIVER	U005	010	IC241	UA96173PC RECEIVER (FAIRCHILD)

PCB1212-4

	U006	010 IC005	26LS33 QUAD DIFF LINE RECEIVER		U007	010 IC209	Z8440BBIN (REPLACES MK3884)
	U008	010 IC207	Z84C20AB6 (REPL MK3881N/Z8420AB1)		U009	010 IC071	7407 HEX BUFFER/DRIVER OC
	U010	010 IC207	Z84C20AB6 (REPL MK3881N/Z8420AB1)		U011	010 OA43	MAX163BCNG A/D CONVERTER
	U012	010 IC277	MAX358CPE MAXIM MUX CHIP		U013	010 IC277	MAX358CPE MAXIM MUX CHIP
	U014	010 IC208	Z84C30AB6 Z80-CTC (MK3882N)		U015	010 IC208	Z84C30AB6 Z80-CTC (MK3882N)
	U016	010 IC208	Z84C30AB6 Z80-CTC (MK3882N)		U017	010 IC203	MC1489L QUAD EIA-232C RECEIVER
	U018	010 PL000070	IC272 GAL16V8A-15	1	U018	010 SKT05	RN ICL-203-S6G
	U019	010 PL000068	IC272 GAL16V8A-15	1	U019	010 SKT05	RN ICL-203-S6G
2	U020	010 IC257	DS1230Y DALLAS 256K STATIC RAM	2	U020	010 SKT07	RN ICL-286-S7G
2	U021	010 IC063	TMS27C256-200JO EPROM (200 NS)	2	U021	010 SKT07	RN ICL-286-S7G
3	U022	010 IC206	Z84C00BB6 OR Z8400BB1 Z80 CPU 6MHZ	3	U022	010 SKT08	RN ICL-406-S7G
	U023	010 IC253	DS1232 DALLAS	5	U024	010 IC156	74LS74 D-FLIP-FLOP